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UNITED STATES DEPARTMENT OF THE INTERIOR
MINING ENFORCEMENT AND SAFETY ADMINISTRATION

COAL MINE HEALTH AND SAFETY DISTRICT 5

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RICHLANDS, VIRGINIA 24641

REPORT OF FATAL COAL-MINE BUMP ACCIDENT

BEATRICE MINE
BEATRICE POCAHONTAS COMPANY
KEEN MOUNTAIN, BUCHANAN COUNTY, VIRGINIA

May 15, 1974

by

M. L. West
Subdistrict Manager

and

C. E. McGraw
Coal-Mine Inspection Supervisor

Originating Office - Mining Enforcement and Safety Administration
Richlands, Virginia 24641
M. L. West, Subdistrict Manager
Richlands, Virginia Subdistrict, Coal Mine Health and Safety

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INTRODUCTION

This report is based on an investigation made pursuant to the provisions of the Federal Coal Mine Health and Safety Act of 1969 (83 Stat. 742).

At 10:17 p.m., Wednesday, May 17, 1974, a coal outburst occurred in a chain pillar on the tail entry side and directly across from No. 3 longwall plow face. The accident resulted in the death of Willard Griffith, jack setter, who was performing the duties of a stall machine operator's helper, and in injuries to Darrie Foster, longwall foreman; George Shortridge, assistant longwall foreman; and Arnel McGlothlin, plow head operator.

Willard Griffith, age 32 (Social Security No. 228-60-2013), had 6½ years mining experience, the last 4½ years at this mine. He is survived by his widow and two dependent children.

Darrie Foster, age 47, has 27 years mining experience, the last 10 years at this mine. His injuries included a laceration on his head and abrasions on his face, chest, and right leg.

George Shortridge, age 45, has 21½ years mining experience, the last 10 years at this mine. His injuries included a laceration on his head and abrasions on his face, chest and right leg.

Arnel McGlothlin, age 48, has 20 years mining experience, the last 10 years with this company. He sustained abrasions on his chest and both legs. McGlothlin was approximately 500 feet from where the coal outburst originated. The three injured men have recovered from their injuries and returned to work.

Forces from the outburst damaged two motors on the tail section of the plow conveyors and strewed loose coal, crib blocks and other debris in the tail entry. The outburst registered 1.0 on the Richter scale at the Seismological Observatory, Virginia Polytechnic and State University, Blacksburg, Virginia, about 80 miles from the epicenter of the occurrence.

The No. 3 longwall section plow (the fifth and last panel in this area), located between the Nos. 6 and 7 development panels off 1 south off 4 west, was 450 feet by 3,300 feet of which approximately 1,150 feet had been mined. Fifteen men were working in the longwall area and 106 men in other areas of the mine at the time of occurrence.

A Federal Coal-Mine Inspector was informed of the occurrence while on a routine inspection of the mine. He immediately notified the Subdistrict Manager of the Richlands, Virginia office. An investigation was started promptly.

Information for this report was obtained from an investigation at the scene of the accident and from information and statements obtained from company officials, employees, and injured men.

GENERAL INFORMATION

The Beatrice Mine, at Keen Mountain, Buchanan County, Virginia, is opened by 4 circular concrete-lined shafts, which intersect the Pocahontas No. 3 coalbed at an average depth of 1,345 feet. The coalbed averages 56 inches in thickness locally. Of the 513 men employed, 468 worked underground on 3 coal-producing shifts a day, 5 and 6 days a week, and produced a daily average of 5,100 tons of coal, all mechanically loaded. All coal was transported from the working sections on flame-resistant belt conveyors to centralized loading points, then transferred to mine cars for transportation by trolley locomotives to the skip shafts. Mining consisted of developing main, cross, and panel entries with continuous mining machines. Panel entries were being developed for longwall mining. Main and cross entries were driven in sets of 4 to 8 on 100-foot centers with crosscuts on 100-foot centers. Longwall access entries were developed in sets of 4 to provide entries for two intake and two return airways - utilizing

such airways to provide two splits of air for dust control and to dilute methane being liberated during development. Entries were driven on 50- and 100-foot centers and crosscuts were on 100-foot centers. Immediately adjacent to the longwall rib on the tail entry side, pillars (80' X 80') were left to afford greater tail entry protection from increased overburden weight created by the gob area of the previously mined longwall blocks. Pillars nearest the gob on the tail entry side were 30' X 80'.

Generally, the immediate roof is a combination of thin fragile shale, sandstone, and coal streak laminations; the coal is friable and the floor is susceptible to heaving. However, in the area of occurrence, the floor was a dense, sandy shale which resisted heaving and, according to the log of ventilation hole No. 31, drilled about 530 feet outby the No. 3 longwall plow face, the roof structure, beginning at the coalbed and for a distance of 682 feet, was 25 feet of shale interspersed with sandstone, 60 feet of massive sandstone, 20 feet of shale interspersed with sandstone, 220 feet of massive sandstone, 75 feet of shale interspersed with sandstone, 42 feet of massive sandstone, 20 feet of shale, and 120 feet of massive sandstone. The overburden in the area of occurrence and for a distance of about 1,600 feet outby, averages about 2,400 feet with a maximum cover of 2,485 feet (See Sketch No. 1). Bumps and coal outbursts occurred in the tail entry of chain pillars during the retreat of the Nos. 2, 3, and 4 longwall blocks. As a result of those bumps, 8 load cells were placed in the tail entry side of the presently mined longwall pillar and two of the 80- X 80-foot chain pillars directly in line with previous bumps, so as to monitor any buildup of pressure. However, this bump occurred about 600 feet inby No. 7 and No. 8 load cell locations. The load cell charts were examined after the coal outburst. There were no noticeable changes in the pressure chart readings except for a "pip" registered on No. 8 chart at the time of the occurrence. The concussion from the bump could have caused this slight variation.

Roof bolts were used as the principle means of roof support and were supplemented with cribs, posts, and crossbars where needed. Roof supports for No. 3 longwall face, which was 450 feet in length, were provided with 98 hydraulic self-advancing support units, each consisting of four 140-ton capacity hydraulically set legs with an articulated canopy. Two rows of cribs had been installed the entire length of the tail entry during development of that set of entries. A stall machine was utilized to keep the tail side of the longwall face advanced about 30 feet ahead of the face conveyor. This eliminated the necessity of removing the previously set cribs during retreat of the longwall face. Six sets

of 140-ton hydraulic jacks, four on the tail entry side and two on the longwall rib side of the stall machine, supported the roof in the stall machine area. The stall machine operator and his helper were responsible for moving these jacks.

The investigation was conducted by Mining Enforcement and Safety Administration personnel. The following persons were present during all or part of the investigation:

BEATRICE POCAHONTAS COMPANY

Thurston Strunk	President
James Gilley	Roof Control Consultant
Paul Thompson	Manager of Mines
William Delomas	Superintendent
David Maynard	Assistant Superintendent
Harold Stanley	Safety Director
Carnie Browning	Safety Engineer
Darrie Foster	Longwall Foreman
George Shortridge	Assistant Longwall Foreman

UNITED MINE WORKERS OF AMERICA

E. W. Gilbert	Safety Coordinator, District 28
Carlos Clark	President, L.U. 1384
Alonzo Mullins	Safety Committeeman, L.U. 1384
Walter Browning	Safety Committeeman, L.U. 1384

VIRGINIA DIVISION OF MINES AND QUARRIES

Lee Hughes	District Inspector (Roof Control)
Phillip Willis	District Inspector

MINING ENFORCEMENT AND SAFETY ADMINISTRATION

W. R. Compton	District Manager
M. L. West	Subdistrict Manager
Robert Elam	Coal-Mine Staff Specialist (Washington Office)
Tony Zona	Supervisory Engineer (Technical Support)
Glenn Springer	Mine Engineering Specialist (Technical Support)
C. E. McGraw	Coal-Mine Inspection Supervisor
J. A. Baker	Federal Coal-Mine Inspector (Roof Control)
Wayland Jessee	Federal Coal-Mine Inspector (Roof Control)
Dempsey Vass	Federal Coal-Mine Inspector

The Beatrice Mine is operated by Beatrice Pocahontas Company and the management structure for the mine consists of a president, manager of mines, superintendent, safety director, safety engineer, mine foreman, chief electricians, shift foremen, and a section foreman for each production crew. Harold Stanley is the official in charge of health and safety for the company and Carnie Browning is in charge of health and safety at the mine. The company's training and retraining program had been submitted to and approved by the Mining Enforcement and Safety Administration on July 2, 1973.

Griffith (victim) had 6½ years mining experience, including 4½ years as a longwall machine jack operator and stall helper, and he was familiar with the duties of his work assignments. Griffith had received training in Job Safety Analysis, Mine Ventilation, Mine Gases, Riken Methane Detector, and had just completed a course on Roof and Rib Control, May 10, 1974.

Both Darrie Foster and George Shortridge, the victim's immediate supervisors, are certified by the State (Certificate Nos. 2595 and 1879, respectively) and have completed training in first-aid, mine gases and detection devices, principles of mine rescue, use and care of flame safety lamps, use of self-rescuer, Coal Mine Health and Safety Act, coal mine ventilation, roof and rib control, and job safety analysis.

A procedure for reporting and recording all accidents that result in injuries is followed, and the fatal and nonfatal frequency for the mine was 0 and 13.14, respectively. The date of the last fatality at this mine was March 25, 1971.

A Federal Coal-Mine Inspector is present at this mine each production shift.

DESCRIPTION OF ACCIDENT

The No. 3 plow crew, under the supervision of Darrie Foster and George Shortridge, entered the mine at 3:40 p.m., Wednesday, May 15, 1974, and arrived on the section at 4:15 p.m. Coal production began about 6 p.m. after the mother line was moved back from the longwall face, repairs made to the hydraulic system of the mother line, and supplies delivered to the tail entry.

The plow cutting head traversed back and forth across the longwall face without incident until about 7:30 p.m., when a roof disturbance occurred on the longwall face near the tail end of the plow. The disturbance caused coal to fall from the longwall face and filled the face conveyor line about 1/3-full of coal for a distance of about 75 feet. After the disturbance, Leonard Miller, plow helper at the tail,

called McGlothlin and instructed him to deenergize the electric power along the longwall face. After the power had been disconnected, Miller made an examination for methane with a permissible methane detector, and found more than 1.0 per centum of methane along the tail end of the longwall face. The methane was diluted and carried away and production resumed at 8 p.m.

As mining progressed, adverse roof conditions were encountered over the face conveyor line between Nos. 51 to 69 hydraulic roof jacks. Both Shortridge and Foster were in this area supervising the advancement of the jacks as coal was being mined. Shortridge left about 10 a.m., and traveled to the tail entry and made an examination in the tail entry and the stall machine area. Shortridge then went to the telephone at the No. 94 hydraulic roof jack, where Woody Dales, jacksetter, was working. About two minutes later, Foster arrived and was conversing with Shortridge and Dales when, at approximately 10:17 p.m., the bump occurred.

Willard Griffith and Willie S. Stacy, stall machine operator, were about 16 feet apart on the tail entry side of the stall machine moving 2 sets of stall machine jacks. Griffith, who was at the rear set of jacks, was thrown against the stall machine conveyor line and was struck and partly covered with crib blocks and loose coal. Stacy was hit with some fine coal, but was not injured. Foster, Shortridge, and Dales, near the telephone, were knocked down by the forces causing injuries to Foster and Shortridge. McGlothlin was slightly injured when he was apparently knocked down by the concussion.

Immediately after recovering from the shock, Dales learned that Griffith, Foster, and Shortridge were injured. The forces from the "outburst" had destroyed the plow face telephone communication system so Dales walked to the plow head, a distance of about 400 feet, to seek help. Upon arriving at the plow head, he was informed that McGlothlin was being treated for injuries received from the concussion. Dales asked Billy Harrison, mother line operator, to notify Joe Gillespie, dispatcher, of the occurrence, that four men were injured and that additional first-aid supplies and help were needed. Dales and Harrison then returned to the tail entry with first-aid equipment and with assistance from Leonard Miller, plow helper, and Michael Belcher, jacksetter, administered first aid to Griffith, Foster, and Shortridge. Griffith and Shortridge were carried on stretchers to the plow head; Foster walked unassisted.

Joe Gillespie, after being notified of the occurrence, stopped all rail traffic, contacted Stan Jones, chief electrician, who is a registered EMT (Paramedic) in the state of Virginia, and informed him of the occurrence. Jones and three other maintenance

men with first-aid equipment, were immediately dispatched to No. 3 longwall plow section. Gillespie then telephoned William Delomas, superintendent, of the occurrence, who in turn called for doctors and ambulances.

Immediately upon arriving at the No. 3 longwall plow section, Jones examined McGlothlin who appeared to be only slightly injured. Jones left an attendant with McGlothlin and was enroute to the tail of the plow when he met the stretcher team carrying Griffith, who, Jones was informed, was the most seriously injured. Jones examined Griffith, who was alive but irrational, and discovered a deep wound near the right arm pit. Additional first-aid treatment was administered and Griffith was then placed in a portal bus and transported to the shaft bottom; thence, via the man hoist to the surface, arriving there about 11:20 p.m. Shortridge, McGlothlin, and Foster were brought to the surface at intervals soon thereafter.

First-aid stations were set up in two offices and two doctors examined and treated the injured men as they were brought to the surface. After being examined and treated, Shortridge, Foster, and McGlothlin were transported by ambulances to a local hospital. Griffith, who was unconscious, did not respond to treatment. He expired after extensive efforts were made to revive him. The causes of death as listed on the death certificate were Pneumothorax and Hemothorax caused by laceration of the lung and compound comminuted rib fractures. An autopsy was not performed.

The investigation disclosed that the bump affected two of the 80- X 80-foot chain pillars. Chain pillars inby the plow conveyor on the tail entry side were inaccessible due to caving and could not be examined. The outburst occurred near the center of the chain pillar directly adjacent to the plow tail and stall area. The forces generated from the "outburst" were in direct line with the plow conveyor line. Coal was expelled violently from the pillar and resembled a "V shot" blasted from the solid coal; also, dense clouds of dust were thrown into suspension. Other than the disturbance that dislodged coal from the longwall face as mentioned earlier in this report, there were, reportedly, no unusual occurrences prior to the accident.

Mr. James Gilley, consultant for Island Creek Coal Company and a recognized authority on coal bumps and outbursts, described this occurrence as a "shock impact bump" which he defined as a quick buildup and release of pressure.

CAUSE OF ACCIDENT

The following conditions, some natural and conducive to bumps and coal outbursts, were the causes of this accident:

1. The 80- X 80-foot size chain pillars immediately adjacent to the longwall block were too large to crush under the massive roof pressure exerted during longwall mining.
2. The floor in the bump area was a dense sandy shale of undetermined thickness that resisted heaving.
3. The immediate roof in the area was shale interspersed with sandstone up to 25 feet thick. Overlying this stratum was a massive bed of sandstone up to 60 feet in thickness.
4. The overburden thickness in the area was 2,400 feet.
5. A sudden pressure was exerted on the chain pillar and the energy was released with sudden violence, causing the outburst.

REQUIREMENTS

1. A system of means to protect persons working in the vicinity of the No. 3 longwall section tailgate from the effects of bumps or outbursts in the tail entry chain pillars shall be established and carried out during the further retreat of this longwall pillar.
2. The system for developing longwall access entries shall be reevaluated with consideration given to the relocation of chain pillars whereby a smaller pillar (30- X 80-foot in size) would intervene between the tail entry of the longwall block and the larger 80- X 80-foot pillar. This smaller chain pillar would not be prone to bump and would serve as a buffer from the effects of possible bumps or outbursts from the larger pillar, thereby affording protection for persons working in the vicinity of the longwall tail entry.

ORDER

Imminent Danger - Section 104(a).

A mountain bump occurred on No. 3 plow unit and 4 employees were injured.

This Order is issued pending an investigation and determination as to the cause, and for the protection of further endangerment to the employees.

Action taken.

Order No. 1 A.D.R. was issued at 11 p.m., May 15, 1974, on Form 104(a), requiring that all persons, except those persons referred to in Section 104(d) of the Act, be prohibited from entering the mine. The Order was modified on May 17, 1974, to permit rehabilitation of No. 3 longwall plow and on May 28, 1974, to permit resumption of production so as to evaluate a new mining system to be followed on No. 3 longwall plow section; this includes leaving a small wing of coal on the return side of the longwall to protect the miners from possible coal outbursts which have occurred in the 80- X 80-foot size tail entry chain pillar. The Order, except as modified, remains in effect.

Respectfully submitted,

/s/ M. L. West

M. L. West
Subdistrict Manager

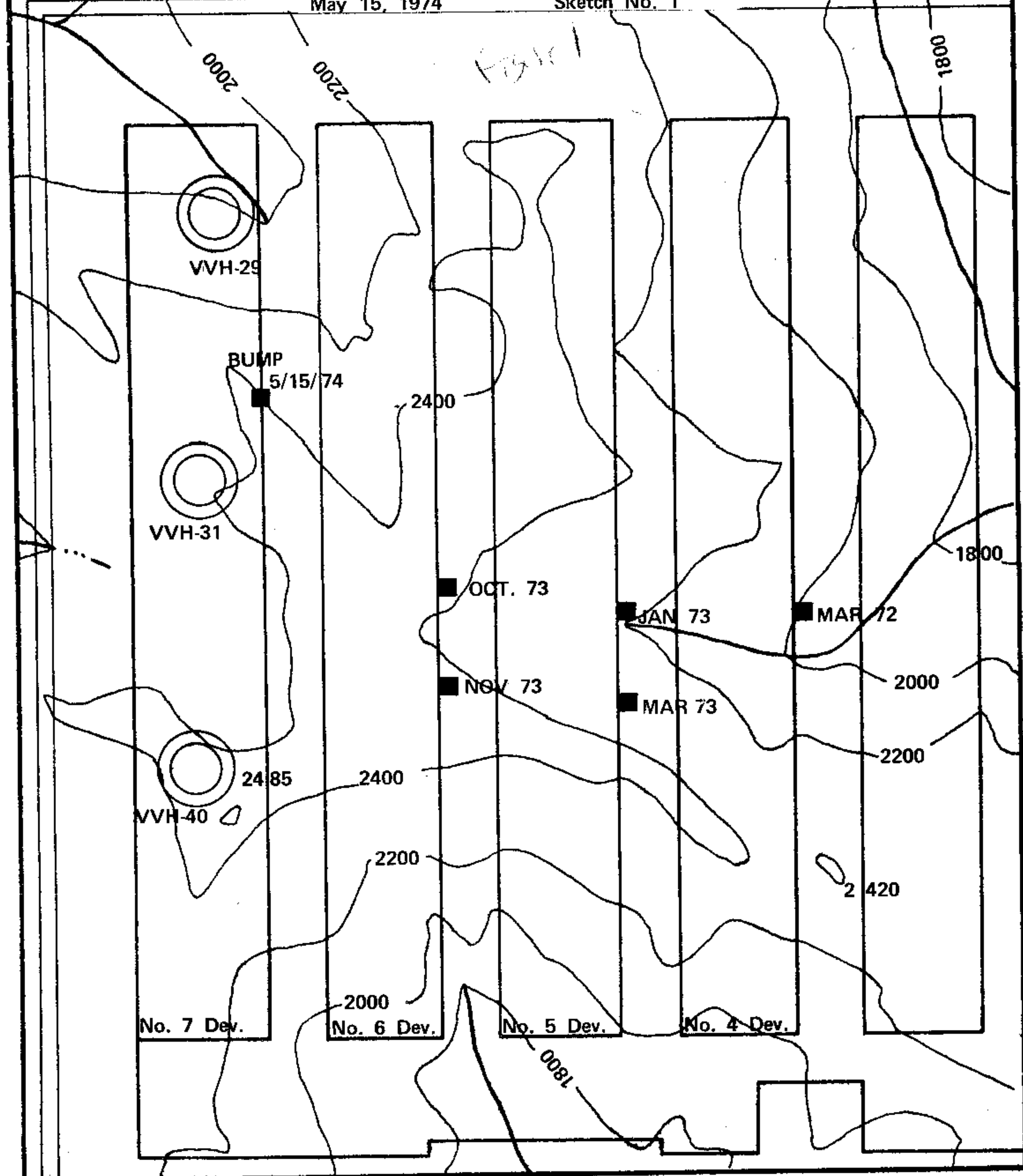
/s/ C. E. McGraw

C. E. McGraw
Coal-Mine Inspection Supervisor

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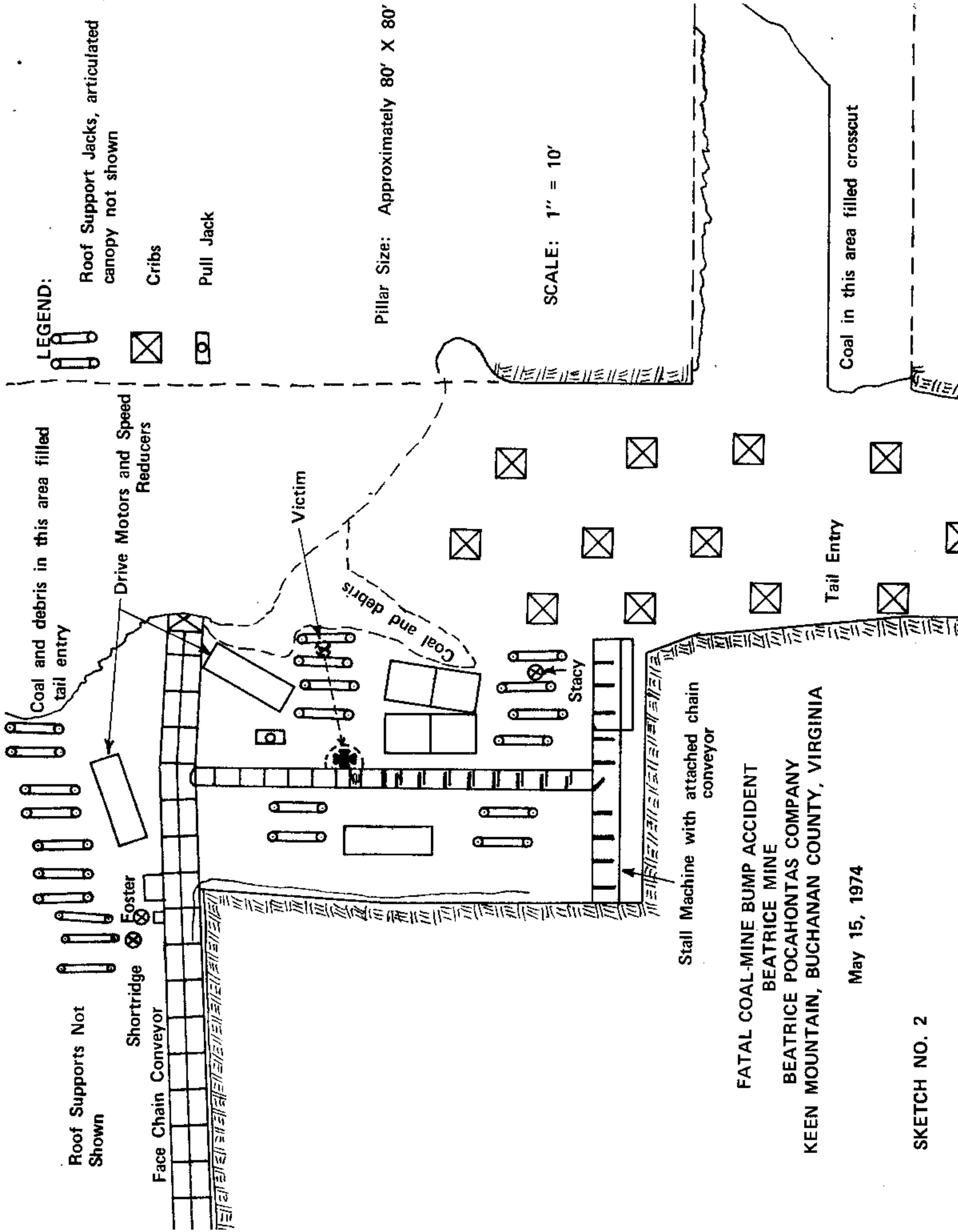
May 15, 1974

Sketch No. 1



SCALE: 1" = 500'

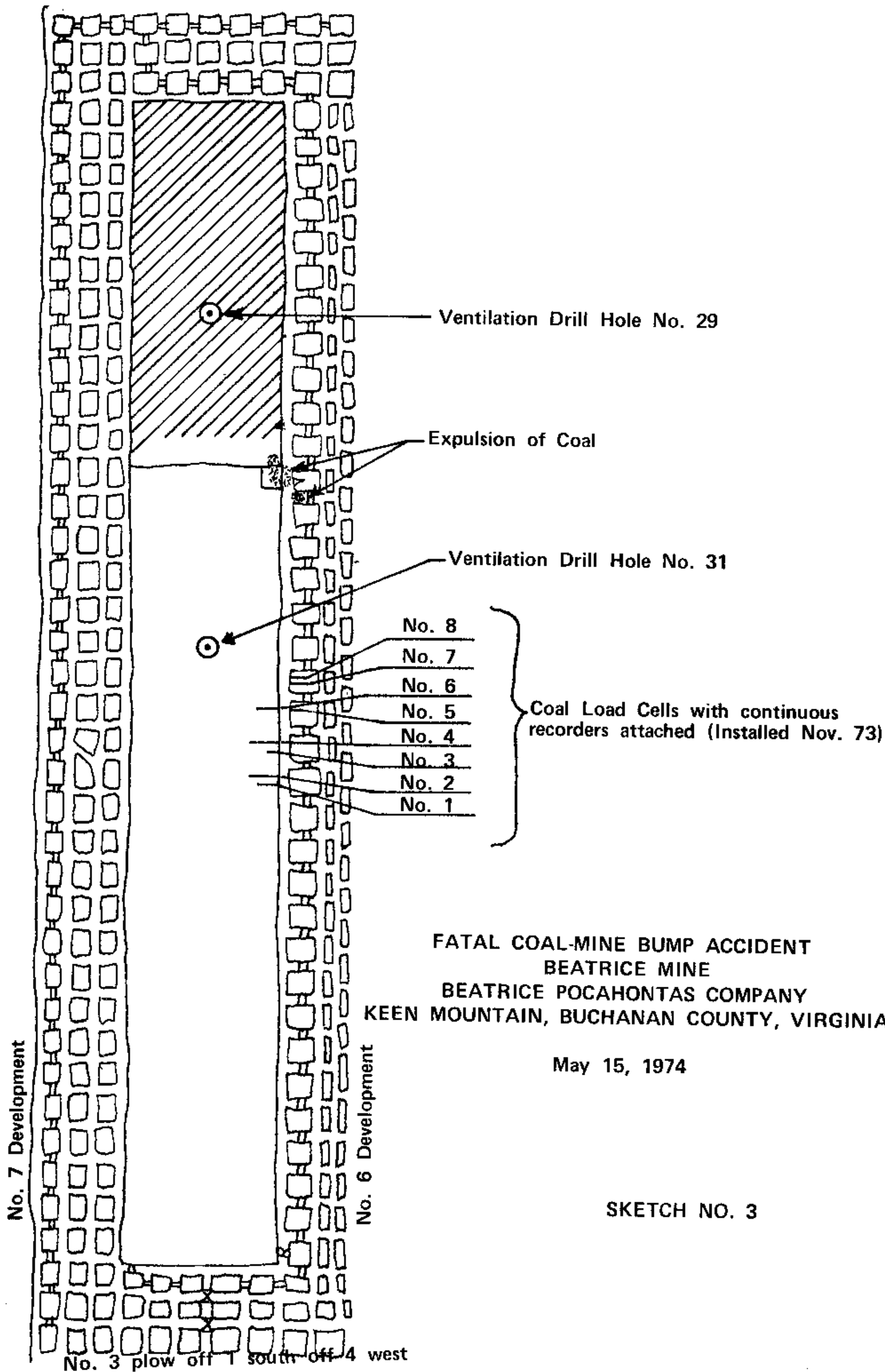
■ BUMP



FATAL COAL-MINE BUMP ACCIDENT
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SKETCH NO. 2



FATAL COAL-MINE BUMP ACCIDENT
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SKETCH NO. 3